

### REMARKS

Applicant has carefully studied the outstanding Official Action. The present remarks are intended to be fully responsive to all points of rejection. Favorable reconsideration and allowance of the present application are hereby respectfully requested.

Applicant thanks the Examiner for the courtesy of a telephonic interview granted on 15 December 2005 to Applicant. The substance of the interview is included in the Interview Summary.

Claims 1 – 14, 26 – 31 and 37 – 52 were examined and are now in the case.

Claims 1 – 14, 26 – 31 and 37 – 52 stand rejected under 35 USC 103(a) as being unpatentable over Published US Patent Application US 2002/0118441 of Kang et al (Kang) and further in view of US Patent 6,636,337 to Johnson et al (Johnson).

Kang describes all-optical logic AND operation in a SOA (semiconductor optical amplifier)-based Mach-Zehnder interferometer.

Johnson describes an optical switching device based on stable, non-absorbing optical hard limiters which optically switches optical information from an input to a number of outputs based upon address information contained in the optical information.

In the outstanding Official Action the Examiner refers to Applicant's arguments filed September 1, 2005 and indicates that nonobviousness cannot be shown by attacking references individually where the rejections are based on combinations of references. The Examiner further refers to Applicant's arguments regarding a lack of motivation to combine Kang with Johnson and indicates that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference and nor is it that the claimed invention must be expressly suggested in any one or all of the references but rather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. The Examiner then takes the position

that a combination of Kang with Johnson does provide a plurality of sets of nonlinear elements and thus inherently can be *configured* to do any optical processing including OFF state of one set of nonlinear elements enabling another set of nonlinear elements to be configured to perform optical processing. The Examiner  
5 further indicates that the present claims do not recite any structural relationships between any of the nonlinear elements.

Claim 1 recites, inter alia, a combination of a set of nonlinear elements in which a first subset of the set of nonlinear elements is configured to function as a set of ON/OFF switches in the "OFF" state to enable a second subset  
10 of the set of nonlinear elements to be configured in at least one optical processing configuration.

In response to the Examiner's rejections Applicant respectfully submits that not only that Kang and Johnson, when taken individually, do not show or suggest the combination recited in claim 1 as already discussed in Applicant's  
15 communication filed 1 September 2005, but also the combined teachings of Kang and Johnson would have not suggested the combination recited in claim 1 to those of ordinary skill in the art.

Referring specifically to the combined teachings of Kang and Johnson as referred to by the Examiner, a combination of Kang with Johnson in which there  
20 are a plurality of sets of nonlinear elements which perform optical processing operations can possibly have only one of the following arrangements of the sets of nonlinear elements: a serial arrangement; a parallel arrangement; and a combined serial and parallel arrangement. For example, Fig. 7 of Johnson shows a parallel arrangement of AND gates, and Fig. 10 of Johnson, which is referred to by the  
25 Examiner in the outstanding Official Action, shows a combined serial and parallel arrangement of different types of gates including AND gates and NOT gates.

In the serial arrangement, each set of nonlinear elements in a series of sets of nonlinear elements provides its output to another set of nonlinear elements in the series. In such a case, configuring a set in the series in the "OFF" state creates a  
30 disconnection in the series because such a configuration blocks input to the following set in the series. Therefore, all sets in the series which follow the set

configured in the "OFF" state will be inoperable or will operate improperly thereby rendering such a combination of Kang with Johnson inoperable.

Additionally, the configuration of the set in the "OFF" state does not affect configurations of any of the other sets in the series and definitely does not enable any of the other sets in the series to be configured in optical processing configurations. Configurations of the other sets in the series are in fact unrelated to the configuration of the set in the "OFF" state, and the combination of Kang with Johnson will be inoperable in the serial arrangement while the set is configured in the "OFF" state regardless of the configurations of the other sets in the series.

In the parallel arrangement, the sets of nonlinear elements provide separate and independent parallel outputs. In such a case, a configuration of any set of nonlinear elements in the "OFF" state blocks output from that set only and does not affect configurations of any of the other sets and definitely does not enable any of the other sets to be configured in optical processing configurations.

The combined serial and parallel arrangement is merely a combination in which a serial arrangement and a parallel arrangement are both used. Therefore, configuring a set of nonlinear elements in the "OFF" state in a combined serial and parallel arrangement either renders the combination of Kang with Johnson inoperable, or does not affect configurations of any of the other sets and does not enable any of the other sets to be configured in optical processing configurations.

Thus, the combined teachings of Kang and Johnson in any of the serial arrangement, the parallel arrangement, and the combined serial and parallel arrangement would have not suggested, and in fact cannot suggest, the combination recited in claim 1 of a set of nonlinear elements in which a first subset of the set of nonlinear elements is configured to function as a set of ON/OFF switches in the "OFF" state to enable a second subset of the set of nonlinear elements to be configured in at least one optical processing configuration.

Additionally, it is respectfully pointed out that the combined teachings of Kang and Johnson cannot allow a case in which a subset of nonlinear elements in the "OFF" state is created by configuring individual semiconductor optical amplifiers (SOAs) from separate all-optical logic devices of Kang in the "OFF" state

because in the all-optical logic device of Kang all the five SOAs are crucial to the operation of the all-optical logic device and if any one of the five SOAs is configured to function in the "OFF" state, the principle of operation of the all-optical logic device changes or the all-optical logic device becomes inoperable.

5           For example, if the SOA which is indicated by reference numeral 30b in Fig. 1 of Kang is configured to function in the "OFF" state, the all-optical logic device of Kang does not receive the pump signal and thus operates improperly or becomes inoperable. The all-optical logic device of Kang also operates improperly or becomes inoperable if, for example, the 1<sup>st</sup> SOA is configured to function in the  
10   "OFF" state because in such a case the all-optical logic device does not receive the probe light.

The combined teachings of Kang and Johnson would have therefore not suggested, and in fact cannot suggest, the combination recited in claim 1.

Combining Kang with Johnson is therefore inappropriate for rejecting  
15   claim 1.

Applicant also respectfully submits that the Examiner did not particularly show in the outstanding Official Action how a plurality of sets of nonlinear elements in a combination of Kang with Johnson can be configured to do any optical processing including OFF state of one set of nonlinear elements enabling  
20   another set of nonlinear elements to be configured to perform optical processing. Applicant believes that lack of such particular showing renders the grounds of rejection unclear and also renders the rejection of claim 1 and of the rest of the claims of the application improper. Applicant therefore respectfully requests that the finality of the outstanding Official Action be withdrawn and a new Official Action  
25   be issued.

It is thus respectfully pointed out that the Examiner has failed to make a *prima facie* case for the unpatentability of claim 1.

With respect to the structural relationships between the nonlinear elements, Applicant believes that the following features of claim 1 are sufficient to  
30   show the necessary relationships between the nonlinear elements: the waveguides interconnecting at least some nonlinear elements in the set of nonlinear elements; the

first subset and the second subset being subsets of the set of nonlinear elements; the first subset being configured to enable the second subset to be configured in at least one optical processing configuration; and the set of nonlinear elements and the waveguides being comprised in the configurable integrated optical gate matrix.

5           Claim 1 is therefore deemed allowable.

          Claims 2 – 11 depend directly or indirectly from claim 1 and recite additional patentable subject matter.

          Claims 2 – 11 are therefore deemed allowable.

10           The arguments submitted above with respect to the patentability of claim 1, and particularly the arguments regarding the combined teachings of Kang and Johnson not allowing a case in which a subset of nonlinear elements in the “OFF” state is created by configuring individual SOAs from separate all-optical logic devices of Kang in the “OFF” state, also apply to claim 12.

          Claim 12 is therefore deemed allowable.

15           Claims 13 and 14 depend from claim 12 and recite additional patentable subject matter.

          Claims 13 and 14 are therefore deemed allowable.

          The arguments submitted above with respect to the patentability of claim 1 also apply to claim 26.

20           Claim 26 is therefore deemed allowable.

          Claims 27 – 29 depend from claim 26 and recite additional patentable subject matter.

          Claims 27 – 29 are therefore deemed allowable.

25           Claim 30 is a method claim corresponding to claim 12. The arguments submitted above with respect to the patentability of claim 12 also apply to claim 30.

          Claim 30 is therefore deemed allowable.

          Claim 31 depends from claim 30 and recites additional patentable subject matter.

          Claim 31 is therefore deemed allowable.

30           The arguments submitted above with respect to the patentability of claim 1 also apply to claim 37.

In claim 37 the structural relationships between the nonlinear elements are shown by the following features: the first subset and the second subset being subsets of the set of nonlinear elements; the second subset being configured in at least one optical processing configuration enabled by the configuration of the first subset; and the first subset and the second subset being comprised in the configurable integrated optical gate matrix. Applicant believes that such features are sufficient to show the necessary relationships between the nonlinear elements.

Claim 37 is therefore deemed allowable.

Claims 38 – 40 depend from claim 37 and recite additional patentable subject matter.

Claims 38 – 40 are therefore deemed allowable.

Claims 41 – 46 depend from claim 1 and recite additional patentable subject matter.

Claims 41 – 46 are therefore deemed allowable.

Claims 47 and 48 depend from claim 12 and recite additional patentable subject matter.

Claims 47 and 48 are therefore deemed allowable.

Claims 49 – 52 depend from claim 26 and recite additional patentable subject matter.

Claims 49 – 52 are therefore deemed allowable.

In view of the foregoing remarks, it is respectfully submitted that the present application is now in condition for allowance. Favorable reconsideration and allowance of the present application are respectfully requested.

Respectfully submitted,



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